The University of Maine
DigitalCommons@UMaine

General University of Maine Publications | University of Maine Publications

2021

Student Learning Outcomes College of Engineering

Office of Institutional Research and Assessment

Follow this and additional works at: https://digitalcommons.library.umaine.edu/univ_publications

 Part of the Higher Education Commons, and the History Commons

Repository Citation

Office of Institutional Research and Assessment, "Student Learning Outcomes College of Engineering" (2021). *General University of Maine Publications*. 2138.
https://digitalcommons.library.umaine.edu/univ_publications/2138

This Article is brought to you for free and open access by DigitalCommons@UMaine. It has been accepted for inclusion in General University of Maine Publications by an authorized administrator of DigitalCommons@UMaine. For more information, please contact um.library.technical.services@maine.edu.

Chemical and Biomedical Engineering

B.S. Degree in Biomedical Engineering

The Biomedical Engineering Program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. This program leads to a Bachelor of Science degree in Biomedical Engineering.

Recommended BEN B.S. Curriculum (For Students Matriculating Fall 2019 or Later)
Recommended BEN B.S. Curriculum (For Students Matriculating Fall 2018 or Later)
Recommended BEN B.S. Curriculum (For Students Matriculating Fall 2017)
Recommended BEN B.S. Curriculum (For Students Matriculating Fall 2016)
Recommended BEN B.S. Curriculum (For Students Matriculating before Fall 2016)
BEN Flyer New Curriculum

The mission of the Biomedical Engineering program reflects the mission of Maine's Land Grant University, specifically to provide teaching, research and public service in the discipline of Biomedical Engineering. The goal of the Bachelor of Science program is to prepare students for employment or graduate education in fields associated with clinical, therapeutic, and diagnostic applications of Biomedical Engineering. Students are given high quality undergraduate engineering instruction directed toward the instrumentation and techniques employed to analyze biological systems and processes, the challenges and methodologies associated with manipulating biological systems, and the current and future applications of Biomedical Engineering.

Program Objectives

The program educational objectives are that in the time frame of three to five years after graduation our students will:

- Hold positions that utilize their engineering training and have advanced in their job responsibilities, or be pursuing postgraduate education
- Be working as engineering professionals, act ethically by adhering to standards and being committed to the health and safety of employees and the general population
- Be pursuing innovative solutions to current societal challenges and continue to improve themselves through a variety of learning opportunities
- Contribute to their employer and society by working effectively in the global economy, contribute to professional, civic, or governmental organizations, be leading or working collaboratively in teams, and be communicating with diverse groups

Student Outcomes

Upon completion of the program, our students will be able to:

- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- Communicate effectively with a range of audiences

- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- Acquire and apply new knowledge as needed, using appropriate learning strategies

Program Description

The field of Biomedical Engineering encompasses a broad range of topics, all of which focus on the interface between biology and engineering. Biomedical Engineers use engineering skills to design devices or develop methods that interface with biological systems to benefit society. For example, Biomedical Engineers might be involved in the design of artificial organs, development of new methods to detect or treat cancer, production of devices to measure biological agents, or formulation of materials for the controlled release of drugs. Biomedical Engineers work at the forefront of research and industry and frequently address clinical, diagnostic, and therapeutic applications of engineering. Students entering UMaine's Biomedical Engineering B.S. program typically have a strong interest in science and problem solving. The curriculum provides thorough training in the fundamentals of engineering, mathematics and science, combined with additional elective coursework in engineering, humanities, and social sciences. Employing this knowledge base, students develop the skills to engineer solutions to real world problems.

UMaine's College of Engineering offers a five-year BS-MBA degree with the Maine Business School, as well as a minor in Engineering Leadership and Management.

Students intending to apply for admission to Medical School may consider completing a Minor in Pre-Medical Studies. Minimal coursework in addition to the Biomedical Engineering curriculum is required.

Degrees are awarded upon satisfactory completion of 132 credits with a cumulative grade point average of not less than 2.0 in Biomedical Engineering (BEN) courses.

Program Enrollment and Graduation Data

The UMaine Office of Institutional Research annually compiles statistical data for all programs across campus. Enrollment and graduation data for all Engineering programs can be found at:

- College of Engineering Enrollment by Majors
- College of Engineering Degrees Conferred by Department

Summer Internships, Undergraduate Research Experiences, and the Cooperative Work Experience Program Option in Biomedical Engineering

UMaine faculty members help students obtain summer internships in leading research and diagnostics development laboratories throughout New England. Internships with these companies and research institutions typically take place in the junior and senior years of the program.

Students are encouraged to undertake undergraduate research experiences in the laboratories of the department faculty. UMaine Biomedical Engineering professors are all highly active and accomplished researchers. Research projects have included the development of nanoprobes for detection and imaging of cancer; creation of model cellular membranes for the study of membrane-protein interactions, molecular biosensors for detecting pathogens and toxins, and improving tissue-implant compatibility. Undergraduates are encouraged to participate in projects such as these to gain hands-on experience in the field, either for course credit, or as paid employees.

Students with satisfactory academic standing at the end of their fourth semester may elect to participate in the "Co-Op" program. This fifteen month program involves two fourteen-week sessions of paid, supervised professional experience as a junior engineer. The Co-Op sessions are typically scheduled during alternating semesters of the third year with a semester of coursework between the sessions. Students are able to participate in the Co-Op experience and still graduate in four years by rescheduling their coursework and taking classes during a summer term. Participating students must register for six credits which, in general, cannot be substituted for the courses required for the BS degree.

Employment Opportunities

The B.S. degree is suitable for entry-level engineering careers and as preparation for graduate-level study in engineering or scientific disciplines. The degree also serves as an excellent foundation for admission to medical degree programs. For students who wish to pursue advanced postgraduate studies in this area, UMaine also offers a Master of Science degree in Biomedical Engineering, in addition to a Ph.D. in Biomedical Engineering through the Graduate School of Biomedical Science and Engineering.

Undergraduate Programs

- B.S. Degree in Chemical Engineering
- B.S. Degree in Biomedical Engineering
- Scholarships

- Co-Op Program
- Courses
- Who to Contact

Apply Now

THE UNIVERSITY OF MAINE

Chemical and Biomedical Engineering

B.S. Degree in Chemical Engineering

The Chemical Engineering Program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. This program leads to a Bachelor of Science degree in chemical engineering.

Recommended CHE B.S. Curriculum (*for Students Matriculated in Fall 2020 or Later*)
Recommended CHE B.S. Curriculum (*for Students Matriculated before Fall 2020*)
Sample Honors and CHE B.S. Curriculum (*for Students Matriculated before Fall 2020*)
CHE Prerequisites Flowchart

Chemical Engineers are concerned primarily with the design, operation and management of processing systems to alter and upgrade raw materials into products that are more useful to society (and therefore more valuable). In the design and operation of such facilities two competing concerns are generally paramount: the need to minimize both costs and environmental impact. Since chemical engineers are employed in many different industries, the basic training is general and not industry-specific.

The Bachelor of Science program in Chemical Engineering is broadly based and built on a thorough grounding in mathematics, physics and chemistry followed by the study of thermodynamics, kinetics, fluid mechanics and unit operations. Economics, process design and more specialized technical electives are studied during the final year.

Key goals of the program are to develop analytical and problem solving skills, communication skills and a level of general education that will allow the graduate to function effectively as a chemical engineer in the twenty-first century.

Program Objectives

Our objectives are that in the time frame of three to five years after graduation our students will:

- Hold positions that utilize their engineering training and have advanced in their job responsibilities, or be pursuing postgraduate education
- Be working as engineering professionals, act ethically by adhering to standards and being committed to the health and safety of employees and the general population
- Be pursuing innovative solutions to current societal challenges and continue to improve themselves through a variety of learning opportunities
- Contribute to their employer and society by working effectively in the global economy, contribute to professional, civic, or governmental organizations, be leading or working collaboratively in teams, and be communicating with diverse groups

Student Outcomes

Upon completion of the program, our students will be able to:

- Construct models to describe real systems
- Use models to analyze and optimize system performance
- Complete a design of a process or product that meets specifications, is safe, and is economically optimized
- Consider public health, safety and welfare, as well as global, cultural and social issues in the engineering design process
- Prepare a clear and concise report

- Effectively communicate orally with appropriate visual aids
- Effectively communicate to a range of audiences
- Appropriately apply the professional code of ethics to engineering situations
- Make informed judgments about engineering solutions that consider the impact on global, economic, environmental, and societal contexts
- Function on teams which are able to define a plan to meet project objectives that includes the roles of team members
- Function on teams which are able to effectively include all members in the plan
- Function on teams which are able to implement a plan and meet objectives
- Design and implement appropriate experiments
- Analyze and interpret data using proper methods and present them in a clear and meaningful way
- Interpret data and use engineering judgement to draw conclusions
- Obtain and apply engineering knowledge that was not explicitly covered in the curriculum

Program Requirements

The program requires successful completion of 120 credits* of course work with a minimum cumulative grade point average of 2.0 in Chemical Engineering courses, including technical electives credits. The program can be completed in four academic years of full time study.

*Students matriculated in Fall 2020 or later require a minimum of 120 credits. Students matriculated before Fall 2020 require a minimum of 130 credits.

Program Enrollment and Graduation Data

The UMaine Office of Institutional Research annually compiles statistical data for all programs across campus. Enrollment and graduation data for all Engineering programs can be found at:

- College of Engineering Enrollment by Majors
- College of Engineering Degrees Conferred by Department

Pulp & Paper Management Certificate Concentration

- ACC 201 – Principles of Financial Accounting **Credits:** 3
- GEE 230 – Introduction to Engineering Leadership and Management **Credits:** 1
- CHE 493 – Chemical Engineering Seminar **Credits:** 1
- CHE 494 – Chemical Engineering Practice **Credits:** 2
- MET 320 – Selected Topics in Mechanical Engineering Technology II **Credits:** 3 *
- PPA 264 – Introduction to the Pulp and Paper Industry **Credits:** 3 *
- PPA 466 – Paper Technology **Credits:** 3 *

Notes

- These three courses (marked by *) count as pre-approved technical electives for BS in CHE.
- The 16 credit-hour concentration requirement can double count 9 credits of technical electives.
- MET 320 is a Special Topics Course (Lean Six Sigma). The College of Engineering will issue the Lean Six Sigma Certificates.

Undergraduate Programs

- B.S. Degree in Chemical Engineering
- B.S. Degree in Biomedical Engineering
- Scholarships
- Co-Op Program
- Courses
- Who to Contact

Apply Now

THE UNIVERSITY OF MAINE

Civil and Environmental Engineering

Program Accreditation

ABET Engineering Accreditation Commission

The undergraduate Civil Engineering Program at UMaine is accredited by the Engineering Accreditation Commission of ABET. (www.abet.org)

Program Educational Objectives

The objectives of the Civil Engineering Programs are as follows. Students who complete the program will, 3-5 years after graduation:

1. *Practice the disciplines of transportation, environmental, structural, water resources, and geotechnical engineering, and/or related fields.*
2. *Engage in advanced education, research, and development.*
3. *Pursue continuing education and professional licensure.*
4. *Promote and advance public health and safety, and enhance quality of life.*
5. *Act in a responsible, professional, and ethical manner.*

These objectives have been developed by the Civil & Environmental Engineering faculty, in consultation with the professional engineering community.

Student Outcomes

Upon successful completion of the program the student will have the:

- *ability to apply knowledge of mathematics, science, and engineering.*
- *ability to design and conduct experiments as well as analyze and interpret data.*
- *ability to design a system, component, or process to meet desired needs.*
- *ability to function on multi-desciplinary teams.*
- *ability to identify, formulate, and solve engineering problems.*
- *understanding of professional and ethical responsibility.*
- *ability to communicate effectively.*
- *broad education necessary to understand the impact of engineering solutions in a global and societal context.*
- *recognition for the need for, and an ability to engage in life-long learning.*
- *knowledge of contemporary issues.*
- *ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.*

Annual Student Enrollment and Graduation Data

- The UMaine Civil and Environmental Engineering Program currently grants 50-60 BS degrees in Civil Engineering each year.
- Our present undergraduate enrollment is approximately 270 students.
- For recent historical data on the number of graduates and enrollments, please see the Office of Institutional Research site

Resources

- Facilities
- News & Events
- Useful Links
- Program Accreditation

THE UNIVERSITY OF MAINE

Electrical & Computer Engineering

ECE Student Outcomes

Upon successful completion of the Electrical or Computer Engineering programs, the student will have:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multidisciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility,
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Resources

- Research Areas
- Enrollment Data, Goals, & Accreditation
- Industry
- Alumni

Connect

To stay up to date on the latest department news, please consider joining our ECE department LinkedIn group.

Construction Engineering Technology

Home

CET Overview

The construction engineering technology (CET) program is a blend of civil engineering technology and construction business management. The program combines construction, engineering and management in a practice-oriented education that leads to a rewarding career in which graduates exercise their skills, experience and knowledge to construct buildings and infrastructure nationwide. At UMaine, the average construction engineering technology course enrolls 30 students. More than 98 percent of CET majors work in engineering or construction during the summer. Employers come from across the country recruit program graduates.

Same Great Program as CMT

The construction engineering technology (CET) program at the University of Maine is the same great program that was formerly called Construction Management Technology (CMT). The name was changed so that the program could continue to be accredited under the Engineering Technology Accreditation Commission of ABET (abet.org) Construction Engineering criteria. It allows our graduates to seek professional engineering licensure in many states including Maine.

John McGaheyCET seniors helping build a 3-unit condo project for Habitat for Humanity of Greater Bangor

Construction Engineering Technology Program

University of Maine CET Seniors Rebuilding Muse...

University of Maine Construction Engineering Tec...

CET students practicing with scaffolding in the safety class

Mission statement and outcomes

The Construction Engineering Technology (CET) program develops engineering and professional skills in students who aspire to facilitate construction projects. Our graduates have the ability to work in all stages of the building and infrastructure project lifecycle, from design and

planning through construction, operations and maintenance. Key skills include:

- Practical problem solving
- Communication and collaboration with designers, engineers, owners and the public
- Construction engineering judgement
- An appreciation for community service and the value of our infrastructure

Program highlights

- Service learning construction projects to give back to the community
- Connections to summer employment in the industry
- Development of professional culture
- The ability to eventually become a professional engineer (PE)

Program Educational Objectives

Program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation, based on the needs of the program's constituencies.

The recent graduate of CET should be able to:

1. apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined construction engineering problems;
2. design systems, components or processes for broadly-defined construction methods, operations and schedules;
3. effectively communicate in written, oral, and graphic format with co-workers, management and representatives of other businesses;
4. conduct standard tests and measurements; to conduct, analyze, and interpret construction data; and to apply results to improve processes in construction;
5. and function effectively as a member or leader of a multidisciplinary construction team.

Student Outcomes

Prior to graduation, students are required to demonstrate the following learned capabilities. Graduating students should be able to:

1. apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined construction engineering problems;
2. design systems, components or processes for broadly-defined construction methods, operations and schedules;
3. effectively communicate in written, oral, and graphic format with co-workers, management and representatives of other businesses;
4. conduct standard tests and measurements; to conduct, analyze, and interpret construction data; and to apply results to improve processes in construction;
5. and function effectively as a member or leader of a multidisciplinary construction team.

The Construction Engineering Technology Program is accredited by the Engineering Technology Accreditation Commission of ABET, https://www.abet.org.

Resources

- Apply Today
- CET News Blog
- FE & PE Exams
- FAQ – Students & Family
- FAQ – Employers
- Contact Us

Engineering News

- **Belding promotes manufacturing, engineering jobs in News Center story**

  Published: October 12, 2021

- **Angelina Buzzelli: Addressing affordable housing shortage through additive manufacturing**

  Published: October 12, 2021

- **UMaine civil engineering researchers part of $4M NSF project to create next-gen sensor networks to monitor infrastructure**

Published: October 12, 2021

- **Dagher speaks to Newsy about U.S. offshore wind potential**

  Published: October 8, 2021

- **Vermont Business Magazine, WCAX highlight NSF award for sensor research**

  Published: October 7, 2021

THE UNIVERSITY OF MAINE

Electrical & Computer Engineering

ECE Student Outcomes

Upon successful completion of the Electrical or Computer Engineering programs, the student will have:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. an ability to function on multidisciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility,
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Resources

- Research Areas
- Enrollment Data, Goals, & Accreditation
- Industry
- Alumni

Connect

To stay up to date on the latest department news, please consider joining our ECE department LinkedIn group.

THE UNIVERSITY OF MAINE

Electrical Engineering Technology

Home

Tour Our Labs Virtually! – Take a brief tour of our labs with Professor Paul Villeneuve by visiting:

https://youtube.com/watch?v=bhTr1aO6b2o

EET Overview

The Electrical Engineering Technology (EET) program at the University of Maine prepares students for professional electrical engineering careers in industry. The program provides students with the theory and "hands-on" experience necessary for them to quickly become productive in their jobs after graduation. Accredited by the Engineering Technology Accreditation Commission of ABET, https://www.abet.org

The EET program offers two distinct paths to pursue the degree:

Electrical Option

This option provides students with a traditional electrical and electronic engineering curriculum with extra concentration in subject areas that are particularly important to industry in the Northeast. These subject areas are: analog electronic design, integrated motion control, electrical machinery operation and microcomputer applications. All courses in the program are taught in a way that includes a strong component of practical applications, along with basic theoretical concepts.

Information Technology Option

An increasing industry demand for engineers with basic electrical hardware knowledge along with advanced network communication and management skills has led to this option. This pathway requires students to take the basic electrical courses during the first two years of the program and then branch to information technology courses in the last two years of the program. The eight information technology electives are taken in the areas of information science, management information systems, computer science and computer engineering.

Program Educational Objectives

The mission of the Electrical Engineering Technology Program is to provide a quality education for its students and an outstanding professional development environment for its faculty and students.

To accomplish this mission, the Department has set the following educational objectives for its Electrical Engineering Technology curriculum.

- To prepare students to immediately contribute in the workplace upon graduation through exposure to state of the art industrial equipment, internship experience and design project experience.
- To prepare students in the business of engineering through the understanding of economic and business principles and effective project management techniques.
- To prepare students for the increasing use of computer based technology in industry through the use of computing hardware and software throughout the technical curriculum.
- To provide students with an appreciation for the ethical, legal and professional obligations necessary to function effectively in a contemporary business environment.
- To develop students' communication skills to a level that they can present complex ideas in a clear, logical and concise manner both orally and in writing.

Engineering Technology Combines Engineering Theory with Practical Industrial Management Principles

Regardless of option selection, the EET degree requires students to gain an understanding of engineering management principles. Courses in engineering economics, statistical process control and project management are required of all graduates. This highlights the program's focus on preparing graduates for entry into the work force upon graduation. The program is constantly updated in response to input from an Industrial Advisory Committee that has representatives from manufacturing, power utilities, process industries, data communications and electronics companies.

Student Outcomes

Prior to graduation, students are required to demonstrate the following learned capabilities:

1. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly- defined engineering problems appropriate to the discipline;
2. an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
3. an ability to apply written, oral, and graphical communication in broadly- defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
4. an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and
5. an ability to function effectively as a member or leader on a technical team.

Resources

- Apply Today
- Academics
- FE & PE Exams
- Mission
- Alumni
- FAQs for Students and Family
- FAQs for Employers

Engineering News

- **Belding promotes manufacturing, engineering jobs in News Center story**

  Published: October 12, 2021

- **Angelina Buzzelli: Addressing affordable housing shortage through additive manufacturing**

  Published: October 12, 2021

- **UMaine civil engineering researchers part of $4M NSF project to create next-gen sensor networks to monitor infrastructure**

  Published: October 12, 2021

- **Dagher speaks to Newsy about U.S. offshore wind potential**

  Published: October 8, 2021

- **Vermont Business Magazine, WCAX highlight NSF award for sensor research**

  Published: October 7, 2021

Physics and Astronomy

Undergraduate Majors and Minors

The course work can be demanding, but the department has ways to help and provide support. The laboratory work requires application of new concepts, but you'll learn collaboratively with your classmates. You will need to work, but you will be rewarded for your efforts – today and tomorrow.

Degree programs are offered leading to the following:

- Bachelor of Science in Engineering Physics
- Bachelor of Science in Physics
- Bachelor of Arts in Physics
- Minor in Physics or Astronomy

We offer an uncommon educational experience.

- Our classes are small, beyond the introductory level.
- Homework is graded and returned promptly.
- Faculty members are actively involved in research and development.

Undergraduates can participate in many research areas, such as:

- Astrophysics
- Biophysics
- Environmental radiation
- Imaging science
- Liquid crystals
- Nanotechnology / Surface science / Sensor science and engineering
- Physics education
- Statistical mechanics

- Superconductivity and more!

Get PDF reader

Bachelor of Science in Engineering Physics

Engineering Physics is a curriculum in applied science, including a carefully chosen sequence of engineering electives, which we call a "concentration," in one of the traditional engineering fields. The science and mathematics of engineering are emphasized.

The Engineering Physics program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Our Engineering Physics program is the first ever, established in 1938, and the only accredited engineering physics program in New England.

The Educational Objectives of the University of Maine Engineering Physics Program are to have our graduates:

A. use the versatility afforded by the engineering physics degree to collaborate with a dynamic, diverse, and technically sophisticated workforce by successfully employing engineering/scientific skills, developed at UMaine, in a wide range of fields;

B. continuously improve and expand their technical and professional skills through informal self-study, coursework, pursuit of licensure, or the attainment of advanced degrees in science, engineering, business, or other professional fields;

C. advance the profession and themselves through ethical behavior, communication, teamwork, and leadership;

D. recognize the importance of civic engagement and support the significant roles that engineering and science play in the betterment of society.

In support of these objectives, preparation also includes an introduction to the humanities, social sciences, communications and raising sensitivity to issues of ethics and professional practice.
Furthermore, the program encourages majors to participate in student professional organizations, including the Society of Physics Students, the Society of Women Engineers and the various student societies within the student's chosen engineering field. In addition, majors frequently qualify for membership in the honor societies Sigma Pi Sigma and Tau Beta Pi, among others.

The EPS Learning Outcomes are based on the ABET-developed learning goals for all engineering students.

The University Office of Institutional Research provides statistics on Enrollment and Graduation Rates for all programs in the College of Engineering, including the Engineering Physics Program.

Major Requirements

# Credits Required	Courses
53	Physics (including PHY 100)
24	Engineering Sequence and Technical Elective
25	Mathematics, Chemistry, and Computer Science)
21	English, Human Values / Social Context and Ethics courses
2	Free Elective
125	**Credits required for graduation**

For additional information, download the Curriculum Guide:

- **Fall 2020 BS in Engineering Physics Curriculum Guide (PDF)**
- **Fall 2019 BS in Engineering Physics Curriculum Guide (PDF)**

Back to Top

Bachelor of Science in Physics

The Bachelor of Science in Physics is customarily the prerequisite for graduate education in physics, astronomy, or related areas.

Student Learning Outcomes of the B.S. degree in Physics

Students graduating with a B.S. degree in Physics should have achieved the following goals, which will prepare students for entry and success in graduate programs and/or direct entry into the workforce as scientific/technical professionals:

- An ability to apply physics and mathematics to identify, formulate, and solve physics problems;
- An ability to design and conduct experiments and to analyze and interpret data;
- An ability to use techniques, skills, and instrumentation necessary for modern physics practice including computer techniques (simulations, mathematics, data acquisition and analysis);
- An ability to communicate effectively in oral and written presentations;
- An ability to read and understand the physics literature.

This prepares the student for careers in basic or applied research and development. Because of its strong emphasis on science and mathematics, it is particularly appropriate for careers in research at industrial, governmental, or academic institutions.

Major Requirements

# Credits Required	Courses
53	Physics (with PHY 100)
25	Sciences (7) and Mathematics (18)
21	English (3), Human Values / Social Context and Ethics (18)
21	Electives
120	**Minimum credits for graduation**

For additional information, download an updated Curriculum Guide:

- **B.S. Physics Guide, Fall 2020 (PDF)**
- **B.S. Physics Guide, Fall 2018 – Summer 2020 (PDF).**

Back to Top

Bachelor of Arts in Physics

This program can be tailored to a wide variety of careers, including medicine and dentistry. Students may pursue broad science areas, such as: astronomy, astrophysics, biophysics, environmental studies, geophysics, or physical oceanography. The program also provides a strong science background for students pursuing management, law, or secondary school science teaching careers.

Student Learning Outcomes for the B.A. Degree in Physics

Students graduating with a B.A. degree in Physics should have achieved the following goals, which will prepare students for entry and success in graduate programs and/or direct entry into the workforce as scientific/technical professionals:

- An ability to apply physics and mathematics to identify, formulate, and solve physics problems;
- An ability to design and conduct experiments and to analyze and interpret data;
- An ability to use techniques, skills, and instrumentation necessary for modern physics practice including computer techniques (simulations, mathematics, data acquisition and analysis);
- An ability to communicate effectively in oral and written presentations;

- A broad educational background that provides the basis for contributing as a global citizen.

Major Requirements

# Credits Required	Courses
35	Physics (without PHY 100)
25	Sciences & Mathematics
60	Electives (must also include those necessary to satisfy the College of Liberal Arts and Sciences B.A. requirements)
120	**Minimum credits for graduation** A minimum of 72 hours must be outside the major

For additional information, download an updated Curriculum Guide:

- **B.A. Physics Guide, Fall 2020 (PDF)**
- **B.A. Physics Guide, Fall 2018 – Summer 2020 (PDF).**

Back to Top

Minors in Physics or Astronomy

The Minor in Physics and the Minor in Astronomy are both flexible programs intended for students enrolled in any four-year degree program at the University of Maine. The programs provide a stronger science and mathematics background. Students choose either physics or astronomy as areas of study.

Minor in Physics — requires 21 credits in Physics (12 specified and 9 elective).

Mandatory Courses

Courses	Choices
Physics	PHY 121/122*, PHY 223, PHY 236
Choose 9 credits or more from the following electives	PHY 231, PHY 451, PHY 447, PHY 454, PHY 455, PHY 463, PHY 469, PHY 470, PHY 472, PHY 480; Laboratory courses – up to 3 credits maximum: PHY 224, PHY 229, PHY 262, PHY 364, PHY 365, PHY 471

*may be substituted with PHY 111/112 if previously taken

Download PDF of Physics Minor guide.

Look up these courses by their designators under Courses Offered.

Minor in Astronomy — requires 12 credits in Physics and 9 credits in Astronomy.

Mandatory Courses

Physics	AST 109, AST 110, PHY 121/122*, PHY 223
choose 3 or more Electives	PHY 236, AST 221, AST 227, AST 451, AST 497

* may be substituted with PHY 111/112

Download PDF of Astronomy Minor guide.

Look up these courses by their designators under Courses Offered (Physics courses found here).

Back to Top

Mechanical Engineering

Program Educational Objectives

Within a few years after graduation, those holding a bachelor's degree in Mechanical Engineering from UMaine are expected to:

1. Successfully practice engineering in roles of increasing responsibility to serve local, state, national, and international industries and government agencies.
2. Demonstrate a spirit of lifelong learning by pursuing professional licensure, graduate education, short courses or other training programs in engineering or related fields.
3. Demonstrate professional and ethical responsibility in their work and daily lives.
4. Participate in their community and in so doing advocate for the profession.

Student Outcomes

By the end of their undergraduate degree program in mechanical engineering, students will have:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

- Chair's Message
- Mission & Goals
- Virtual Tour of Engineering Laboratories
- Concentration in Aerospace Engineering
- Open Positions in Mechanical Engineering
- Student Chapters & Clubs
- Career, Internship, & Co-op
- Sponsor a Capstone Project
- Scholarships
- Engineering Tutoring Center
- Mechanical Engineering Tutorials
- Campus Resources
- FE & PE Exams
- Alumni & Friends

News

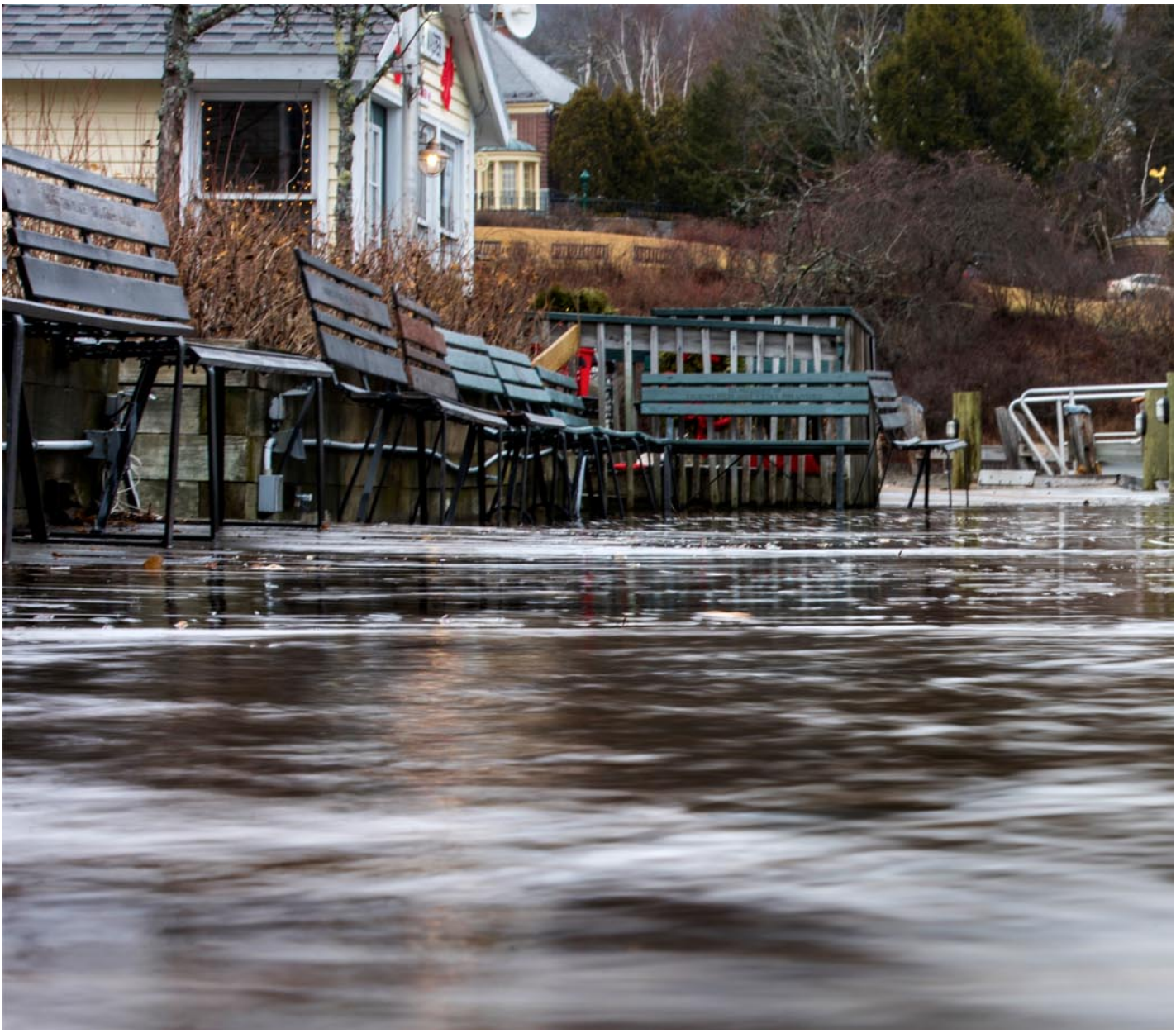
- **Belding promotes manufacturing, engineering jobs in News Center story**

Published: October 12, 2021

- 

Angelina Buzzelli: Addressing affordable housing shortage through additive manufacturing

Published: October 12, 2021



UMaine civil engineering researchers part of $4M NSF project to create next-gen sensor networks to monitor infrastructure

Published: October 12, 2021

- **Dagher speaks to Newsy about U.S. offshore wind potential**

  Published: October 8, 2021

- **Vermont Business Magazine, WCAX highlight NSF award for sensor research**

  Published: October 7, 2021

- **Mainebiz, AP report on DOT grant to create resilient infrastructure**

  Published: October 5, 2021

THE UNIVERSITY OF MAINE

Mechanical Engineering Technology

Home

Mechanical Engineering Technology (MET) is a broad field which prepares students to work as mechanical engineers designing and developing new and innovative products and technologies. Mechanical engineers with an MET degree are involved in every process, from designing delicate tools and parts, to working on huge gears in large vehicles, to operation and maintenance.

Teams of MET students complete design-build projects in both MET 100 Intro to MET in the first semester, and in MET 107 Machine Tool Lab I in the second semester. Teamwork training prepares graduates to work effectively and efficiently on larger projects.

The University of Maine Mechanical Engineering Technology program prepares students for a broad range or engineering activities including the development, design, testing, and manufacturing of products; the design, operation and maintenance of processes, and technical sales and marketing. The scope of mechanical engineering technology includes transportation, power generation, energy conversion, climate control, machine design, manufacturing and automation, and the control of engineering systems and devices.

The College of Engineering recently celebrated the career of MET Professor Emeritus Herbert Crosby at the Gorman Emeriti Brunch! You can download his slides with many photos of the history of the Machine Tool Laboratory and student projects completed in it.

Download our UMaine MET Summer 2019 Newsletter!

The Mechanical Engineering Technology (MET) program is accredited by the Engineering Technology Accreditation Commission of ABET, https://www.abet.org.

Program Educational Objectives

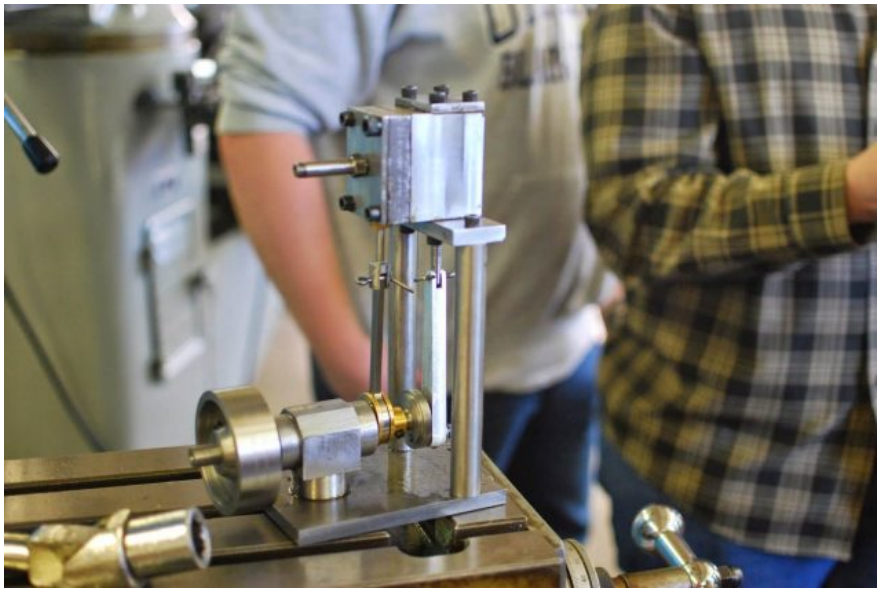
The graduates of the UMaine Mechanical Engineering Technology Program, within a few years after graduation, are expected to:

1. demonstrate a sound knowledge of the fundamental principles of mathematics, science, and mechanical engineering technology;
2. utilize critical thinking and problem solving skills that can be applied to a wide range of problems – both technical and non-technical;
3. carry out the practice of engineering technology;
4. use communication, teamwork, and leadership skills, appreciate social values, and understand the implications of technology;
5. expand technical currency in response to the changing needs of society.

Student Outcomes

Prior to graduation, students are required to demonstrate the following learned capabilities:

1. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
2. an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
3. an ability to apply written, oral, and graphical communication in broadly- defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
4. an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and
5. an ability to function effectively as a member or leader on a technical team.



Program Information

Navigation Menu

- Apply Today
- Scholarships
- First Year Projects
- Fabrication Projects
- Student Organizations
- Capstone Projects
- Internships
- Women in MET
- Contact Us

Engineering News

- **Belding promotes manufacturing, engineering jobs in News Center story**

  Published: October 12, 2021

- **Angelina Buzzelli: Addressing affordable housing shortage through additive manufacturing**

  Published: October 12, 2021

- **UMaine civil engineering researchers part of $4M NSF project to create next-gen sensor networks to monitor infrastructure**

  Published: October 12, 2021

- **Dagher speaks to Newsy about U.S. offshore wind potential**

  Published: October 8, 2021

- **Vermont Business Magazine, WCAX highlight NSF award for sensor research**

  Published: October 7, 2021

Surveying Engineering Technology

Home

Graduate Degree, Surveying Emphasis
Online Surveying Degree
Surveying Certificate

A Combination of Surveying,
Practical Engineering, and Business

The Surveying Engineering Technology program is a surveying program that focuses on skills and education required for professional practice.Accredited by the Engineering Technology Accreditation Commission of ABET, https://www.abet.org

Starting with a basic grounding in mathematics and the physical sciences, the student is concurrently and progressively taught:

Surveying

- Construction Surveying
- Global Positioning Systems
- Geodesy & Geodetic Surveying
- Cadastral Surveying
- Boundary Retracement Surveying
- Remote Sensing
- Photogrammetry
- Geographic Information Systems
- Data Collection

Business

- Engineering Economics
- Small Business Management
- Accounting
- Ethics
- Business & Professional Communications

Engineering

- Civil Engineering Technology
- Land Development

Surveying combines knowledge in mathematics, computers, history, geography, art, business, and communication; coupled with a love of the outdoors (hunting, fishing, snowmobiles, cross country skiing, kayaking, canoeing, hiking, and ATV trail riding) to provide a rewarding career emphasizing independence and responsibility.

Surveying provides a rewarding outdoor career that begins with enrollment in the surveying engineering technology program at the University of Maine.

Program Educational Objectives

The specific program educational objectives are to prepare graduates to:

- Demonstrate a practical understanding of skills in mathematics, basic physical sciences, business, surveying, and engineering sufficient to pass professional registration exams.

- Show proficiency in using surveying equipment and gathering experimental and surveying data for the use of analytical and problem-solving skills reasonably expected for surveying practice necessary to be in responsible charge of surveying operations.
- Be able to apply design skills sufficient to meet employer and client expectations in the areas of land development and survey operations planning.
- Conduct themselves ethically and professionally and exhibit personal integrity and responsibility in surveying practice.
- Be proficient in written, oral, and graphic communication to deal with promotion of professional services, business communications, reporting to clients, interacting with peers, and addressing client matters in public forums.
- Awareness for the arts, humanities, social sciences, and diversity and their place among society and the profession in taking leadership roles in the community and profession.
- Be able to work in a multi-disciplinary team environment, and lead when necessary to accomplish a given mission or project when providing professional services to the public.
- Recognize, participate, and appreciate the need for quality improvement of services, continuous improvement of professional skills, and embarking on lifelong learning.

Student Outcomes

Prior to graduation, students are required to demonstrate the following learned capabilities:

1. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
2. an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
3. an ability to apply written, oral, and graphical communication in broadly- defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
4. an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and
5. an ability to function effectively as a member or leader on a technical team.

Salary and Employment Satisfaction High for Surveyors
(Click to Read More)

Surveying is a GREAT job!
Surveyors ...

- Work outside in nice weather, inside in bad weather (have a tan all Summer);
- Don't get bored with the same scenery (work varies from urban to farm, wilderness to city);
- Combine history with technology, mathematics with law, and art with CAD;
- Assume responsibility quickly with experience (surveying graduates will have all the responsibility they can handle);
- Don't sit behind a desk for long (have an exercise plan as part of surveying practice); and
- Earn a good salary for doing work they enjoy.

Surveying as a Career

Resources

- Apply Today
- Academics
- Transfer Agreements
- Career Opportunities
- Alumni
- FAQ – Students & Family
- FAQ – Employment
- Newsletters & Announcements
- Links
- Contact Us

Engineering News

- **Belding promotes manufacturing, engineering jobs in News Center story**

  Published: October 12, 2021

- **Angelina Buzzelli: Addressing affordable housing shortage through additive manufacturing**

  Published: October 12, 2021

- **UMaine civil engineering researchers part of $4M NSF project to create next-gen sensor networks to monitor infrastructure**

  Published: October 12, 2021

- **Dagher speaks to Newsy about U.S. offshore wind potential**

  Published: October 8, 2021

- **Vermont Business Magazine, WCAX highlight NSF award for sensor research**

  Published: October 7, 2021